Claims:

1. A method of using optical time-domain reflectometry (OTDR) with a bi-directional optical transmission system that includes a plurality of terminals interconnected by first and second unidirectional optical transmission paths having at least one repeater therein, said method comprising the steps of:

transmitting a probe signal from a first terminal through the repeater over the first optical transmission path;

receiving over the first optical transmission path a returned OTDR signal in which status information concerning the first optical transmission path is embodied;

transforming the returned OTDR signal to a digitized electrical signal;

transforming the digitized electrical signal to an optical data signal; and

transmitting the optical data signal over the second optical transmission path to the first terminal for extracting the status information embodied therein.

2. The method of claim 1 wherein the steps of transforming the returned OTDR signal, transforming the digitized electrical signal, and transmitting the optical data signal over the second optical transmission path are performed in said at least one repeater.

3 The method of claim 1 wherein said repeater includes a rare-earth doped optical amplifier through which the probe signal is transmitted.

4. The method of claim 3 wherein the step of receiving the returned OTDR signal is performed at an output of the rare-earth doped optical amplifier.

5. The method of claim 1 further comprising the steps of:

receiving a portion of the probe signal; and

initiating the step of transforming the returned OTDR signal to a digitized electrical signal upon receipt of the probe signal.

6. The method of claim 1 further comprising the step of processing, in the first terminal, the optical data signal to extract the status information.

7. The method of claim 6 wherein the status information includes discontinuities in the first optical transmission path that give rise to optical attenuation.

8. The method of claim 1 wherein the optical data signal is transmitted at a channel wavelength at which the optical transmission system operates.

9. In a bi-directional optical transmission system that includes a plurality of terminals interconnected by first and second unidirectional optical transmission paths supporting a plurality of optical channels and having at least one repeater therein, said repeater comprising:

an optical amplifier having an input for receiving over the first optical path an OTDR probe signal and an output through which the OTDR probe signal is directed; and

an OTDR data acquisition arrangement receiving over the first optical transmission path at the output of the optical amplifier a returned OTDR signal in which status information concerning a span of the first optical transmission path is embodied and, in response thereto, transmitting an optical signal at a channel wavelength along the second optical path in which said status information is embodied in digital form.

10. In the bi-directional optical transmission system of claim 9 wherein said OTDR data acquisition arrangement further includes:

an optical tap located in the first optical transmission path for receiving the returned OTDR signal;

at least one detector coupled to the optical tap for converting the returned OTDR signal to a returned electrical signal;

an A/D converter coupled to the at least one detector for converting the returned electrical signal to a digital electrical signal;

an optical transmitter coupled to the A/D converter for converting the digital electrical signal to said optical signal at the channel wavelength; and

a coupler for coupling said optical signal at the channel wavelength onto the second optical transmission path.

11. In the bi-directional optical transmission system of claim 10 wherein the optical tap comprises at least one coupler for receiving a portion of the OTDR probe signal as well as the returned OTDR signal.

12. In the bi-directional optical transmission system of claim 11 wherein the at least one detector is arranged to also convert the OTDR probe signal to an electrical probe signal and a returned electrical signal.

13. In the bi-directional optical transmission system of claim 12 wherein said at least one coupler for receiving a portion of the OTDR probe signal and the returned OTDR signal is a bi-directional optical tap.

14. In the bi-directional optical transmission system of claim 12 wherein said at least one detector comprises first and second detectors for providing said electrical probe signal and said returned electrical signal, respectively.

15. In the bi-directional optical transmission system of claim 13 wherein said at least one detector comprises first and second detectors for providing said electrical probe signal and said returned electrical signal, respectively.

16. In the bi-directional optical transmission system of claim 15 wherein said OTDR data acquisition arrangement further comprises a gate coupled to the first detector to activate the A/D converter upon receipt of the electrical probe signal.

17. In a bi-directional optical transmission system that includes a plurality of terminals interconnected by first and second unidirectional optical transmission paths supporting a plurality of optical channels and having at least one repeater therein, said repeater comprising:

means for transmitting a probe signal from a first terminal through the repeater over the first optical transmission path;

means for receiving over the first optical transmission path a returned OTDR signal generated in response to the probe signal, said OTDR signal containing status information concerning the first optical transmission path;

means for transforming the returned OTDR signal to a digitized electrical signal;

means for transforming the digitized electrical signal to an optical data signal; and

means for transmitting the optical data signal over the second optical transmission path to the first terminal for extracting the status information embodied therein.

18. In the bi-directional optical transmission system of claim 17 wherein said receiving means includes an optical tap located in the first optical transmission path for receiving the returned OTDR signal.

19. In the bi-directional optical transmission system of claim 18 wherein said transforming means comprises:

at least one detector coupled to the optical tap for converting the returned OTDR signal to a returned electrical signal, respectively;

an A/D converter coupled to the at least one detector for converting the returned electrical signal to a digital electrical signal;

an optical transmitter coupled to the A/D converter for converting the digital electrical signal to said optical signal at the channel wavelength; and

a coupler for coupling said optical signal at the channel wavelength onto the second optical transmission path.

20. In the bi-directional optical transmission system of claim 19 wherein the optical tap comprises at least one coupler for receiving a portion of the OTDR probe signal as well as the returned OTDR signal.

21. In the bi-directional optical transmission system of claim 20 wherein the at least one detector is arranged to also convert the OTDR probe signal to an electrical probe signal and a returned electrical signal.

22. In the bi-directional optical transmission system of claim 21 wherein said at least one coupler for receiving a portion of the OTDR probe signal and the returned OTDR signal is a bi-directional optical tap.

23. In the bi-directional optical transmission system of claim 22 wherein said at least one detector comprises first and second detectors for providing said electrical probe signal and said returned electrical signal, respectively.

24. In the bi-directional optical transmission system of claim 23 wherein said OTDR data acquisition arrangement further comprises a gate coupled to the first detector to activate the A/D converter upon receipt of the electrical probe signal.